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Description of Some Japanese Polyclad Turbellaria.

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With 2 plates and 48 textfigures.

Very little has hitherto been known of the Polyclad fauna of the Japanese coasts. Our studies on the group, obtaining material chiefly from the neighbourhood of Misaki and in part from the coasts of the provinces Awa and Suruga, have thus far revealed twenty-six species, of which seventeen seem to be new to science and which may be referred to fourteen genera. It is now proposed to give in the following brief descriptions of all the forms studied. Certain forms found by YERI—including what appeared to be a *Cestoplana* sp. and an *Acelis* sp.—are left out of consideration in this paper, since the specimens were not in a state fit for close study or exact identification. It is exceedingly probable that a more intensive search in the same regions will bring to light many more new and interesting forms.

Here we beg to express our hearty thanks to Professor I. IJIMA for many valuable aid rendered us during the work. It may also be mentioned here that the collecting of the material and the original preparation of all the figures embodied in this paper were made by YERI several years ago.

List of the species described in this paper.

Order **POLYCLADIDA.**

Suborder **ACOTYLEA.**

A. Section **CRASPEDOMMATA.**

Family **Discocelidæ.**

1. *Discocelis japonica*, n. sp.

Family **Stylochidæ.**

2. *Stylochus rutilus*, n. sp.
3. ,, *ijimai*, n. sp.
4. *Bergendalia diversa*, n. sp.

B. Section **SCHEMATOMMATA.**

Family **Leptoplanidæ.**

5. *Notoplana humilis* (Stimpson).
6. ,, *delicata*, n. sp.
7. *Hoploplana ornata*, n. sp.

Family **Planoceridæ.**

8. *Neoplanocera elongata*, n. gen., n. sp.
9. *Planocera reticulata* (Stimpson).
10. ,, *purpurea*, n. sp.
11. *Paraplanocera misakiensis*, n. sp.

Family **Diplosolenidæ.**

12. *Pseudostylochus takeshitai*, n. gen., n. sp.
13. ,, *fulvus*, n. sp.
14. ,, *obscurus* (Stimpson).
15. *Callioplana marginata* Stimpson.

Suborder **COTYLEA.**

Family **Pseudoceridæ.**

16. *Thysanozoon brocchii* (Grube).
17. *Pseudoceros reticulatus*, n. sp.
18. ,, *lacteus* (Collingwood) ?
19. ,, *luteomarginatus*, n. sp.
20. ,, *nigromarginatus*, n. sp.

Family **Euryleptidæ.**

21. *Cycloporus papillosus* (M. Sars).

Family **Prosthiostomidæ.**

22. *Prosthiostomum siphunculus* (Delle Chiaje).
23. ,, *grande* Stimpson.
24. ,, *marmoratum*, n. sp.
25. ,, *awaense*, n. sp.
26. ,, *rubropunctatum*, n. sp.

Suborder **ACOTYLEA** Lang.

A. Section **CRASPEDOMMATA** Bock.

Family **Discocelidæ** Laidlaw.

Genus ***Discocelis*** Ehrbg. 1836.

1. *Discocelis japonica*, n. sp.

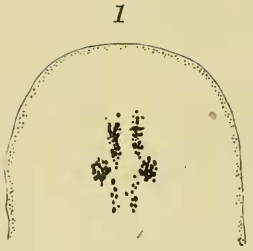
(Pl. II., fig. 3.—Textfig. 1).

A large number of this new species were obtained at Misaki, Enoura in Prov. Suruga, and Shirahama in Prov. Awa, at the low-tide mark.

Body broadly oval, rather thick and of a moderately firm consistence, usually reaching 40 mm. in length and 20 mm. in breadth.

Colour of dorsal surface light vinaceous cinnamon, darker in the central parts, and uniformly spotted all over with small darkish brown blotches which become gradually smaller and fainter towards the body margin. Ventral surface much paler than the dorsal, without the blotches. Pharynx and genital system discernible to a certain degree on the outside.

Tentacles absent. Tentacular eye-spots occurring in two round, crowded clusters, situated at a distance of about one-fifth the body-length from the anterior end and separated from each other by a distance of 2 mm.; each cluster consisting of 15–20 eye-spots, surrounded by a clear space. Cerebral eye-spots present



Textfig. 1. Eye-spots of *Discocelis japonica*.

in two elongate clusters on each side of the median line; each cluster divided by the brain into an anterior and a posterior group, the former consisting of more numerous and more crowdedly occurring eye-spots than the latter. Further, numerous marginal eye-spots distributed in a horseshoe-shaped tract close to the head margin; there existing in the width of that tract commonly two or three eye-spots (textfig. 1). The tract may extend posteriorly on either side to the level of the anterior end of pharyngeal chamber.

Mouth situated nearly in the centre of body, sometimes even in front of it. Pharyngeal chamber extending nearly throughout the second and third quarters of body-length, supplied with numerous lateral diverticula corresponding to pharyngeal folds. Main gut giving rise to about 12 pairs of lateral intestinal branches; the subbranches not undergoing anastomosis.

In structural respects of the genital organs, the present species agrees well with *Discocelis tigrina* (Blanchard) from Naples. The seminal canals are continuous across the median line near the posterior body-end. From that point they swing forward on each side, diverging all the while up to either the hind end of pharyngeal chamber or near the commencement of the last quarter of the latter. Here they turn abruptly backward and inward, and after running for some distance parallel to their outer limb, pass inward to unite into a single duct, the ejaculatory duct, which runs to the penis without forming a seminal vesicle. The penis is a large blunt snail-foot-like body vertically placed in the anterior parts (antrum musculinum) of the ellipsoid antrum. This opens to the exterior at a distance of about 7 mm. behind the mouth. The prostate is represented by a large number of glands of a prostatic character, found in the walls of penis and of antrum musculinum, quite as in *D. tigrina*.

In its hind parts the antrum gives rise to the vaginal canal, which, surrounded by numerous shell glands, pursues a somewhat

tortuous course upward and backward, and after receiving the unpaired common uterine duct, proceeds farther backward to enter the horseshoe-shaped accessory vesicle in the medial part.

In the features of its anatomy the worm is apparently closely allied to *Discocelis tigrina* (Blanchard) [Lang 1884] known from Naples, but may be distinguished from this in the colour marking as well as in the arrangement of cerebral eye-spots. On the strength of that fact, the present Japanese form may be held to be specifically distinct from the Neapolitan.

Family **Stylochidæ** Stimpson (Bock 1913 emend.).

Genus ***Stylochus*** Ehrbg. 1831.

2. *Stylochus rutilus*, n. sp.

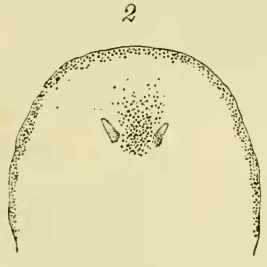
(Pl. II., fig. 1.—Textfig. 2).

A single specimen of this new species was obtained at Mera on the southern coast of Prov. Awa, in the summer of 1906.

Body oval or elliptical, of a moderately firm consistence, measuring 30 mm. in length and 15 mm. in breadth.

Colour of dorsal surface reddish orange or brick colour, dotted more or less uniformly with minute reddish spots. In the region of pharynx runs medianly a deeply reddish line, which may be bordered laterally by a zone of a much lighter tone in colour. Vental surface pale whitish, without pigment, showing pharynx and reproductive system with moderate distinctness.

Nuchal tentacles short, conical, orange-coloured, situated at a distance of 5 mm. from frontal margin, and 3 mm. apart.



Textfig. 2. Eye-spots of *Stylochus rutilus*.

Tentacular eye-spots confined to the basal parts of each tentacle. Cerebral eye-spots distributed close together over the brain region and between the tentacles. Exceedingly numerous additional eye-spots present along body margin in the anterior half of the body (textfig. 2).

Mouth nearly exactly in the centre of body. Male and female genital apertures approximated, both situated near the posterior body end.

Numerous testes situated in the ventral half of body. The seminal canal of either side pursues a somewhat winding course before entering the lateral lobes of the seminal vesicle, which is a large trilobed muscular body as in *St. littoralis* (Verrill), *St. orientalis* Bock, etc. The median vesicle gradually narrows towards the tip of penis, forming the ejaculatory duct. In its course, the duct receives dorsally that of the prostate a short distance in front of penis base. The prostate duct passes forward, dorsally to the ejaculatory duct, to join the prostate, which is of the *Djiboutiensis* type and is a pear-shaped, muscular organ divided into small compartments. Imbedded in the parenchyma around the prostate are numerous glandular cells opening into its lumen. The small conical penis is altogether devoid of chitinous spines or stylets and lies in the anterior part of the antrum musculinum.

As usual the ovaries are dorsally situated. The uteri run backward on either side of the median line, and open separately into the terminal part of the median egg-canal, which shows no sign of an accessory vesicle. The canal proceeds forward and then suddenly makes a downward turn to become the shell-gland passage, which opens to the exterior without forming a vagina bulbosa.

3. *Stylochus ijimai*, n. sp.

(Pl. II., fig. 8.—Textfigs. 3–5).

Numerous specimens of this new species were collected between the tide-marks in the neighbourhood of Enoura in Prov. Suruga.

Body broadly elliptical, leaf-like but rather thick and of a firm consistence, reaching 50 mm. in length and 30 mm. in breadth.

Ground colour of dorsal surface deeply buffy, dotted more or less uniformly with minute purplish gray pigment spots. Medianly in the region of pharynx there exists a deep brownish purple band, which fades away laterally. Ventral surface much paler, unpigmented, revealing pharynx and reproductive system as whitish spaces.

Nuchal tentacles slenderly conical, of a dark brown colour, situated at a distance of about 9 mm. from the anterior body margin, and 3 mm. apart from each other.

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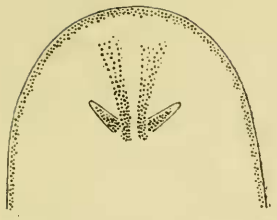

Textfig. 3. Eye-spots of *Stylochus ijimai*.

Tentacular eye-spots arranged close together on tentacles; cerebral eye-spots in two bands on either side of the median line, each band consisting of eye-spots arranged in linear series which slightly diverge anteriorly. Numerous marginal eye-spots not extending all round the body, but reaching to about the end of the anterior three-quarters of body on both sides (textfig. 3).

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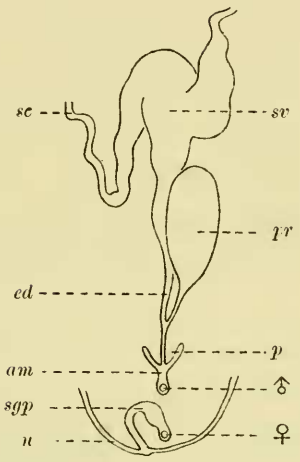

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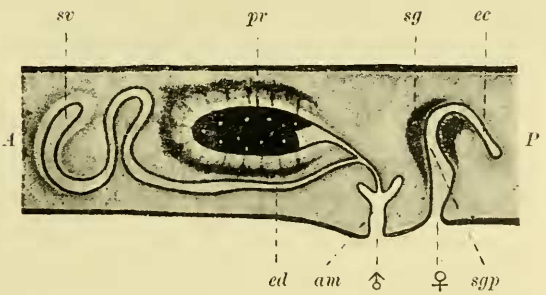


Textfig. 4. Diagrammatic combination figure of the genital end-organs of *St. ijimai*, as seen from the dorsal side.
Textfig. 5. Semidiagrammatic representation of the genital end-organs of *St. ijimai* in sagittal section.
A anterior, *am* antrum musculium, *ec* egg-canal, *ed* ejaculatory duct, *P* posterior, *p* penis, *pr* prostate, *sc* seminal canal, *sg* shell gland, *sgp* shell-gland passage, *sv* seminal vesicle, *u* uterus, ♂ male genital aperture, ♀ female genital aperture.

Mouth placed nearly in the centre of body; male and female genital apertures situated close to each other near the posterior body end.

Genital end-organs (textfigs. 4, 5) are essentially as in the preceding species or in *St. orientalis*. Seminal canal (*sc*) of each side communicates with the lateral lobe of the seminal vesicle (*sv*) which is a large trilobed organ. The median vesicle gradually narrows behind to continue itself into the ejaculatory duct (*ed*), which pursues backward a tortuous

course and receives the duct of the prostate (*pr*). The conical penis is of a small size and is vertically disposed in the penis sheath, which opens externally through the short tubular antrum.

After receiving as usual the uterine ducts, the median egg-canal (*ec*) pursues a somewhat tortuous course before expanding into the shell-gland passage (*sgp*) or the antrum femininum.

The present species seems to be nearly allied to *Stylochus orientalis* Bock (1913), but may be distinguished from it chiefly by the eye-spots in different arrangement as well as by the larger size and the grayish orange colour of body.

Genus ***Bergendalia*** Laidlaw 1903 (emend.).

(Provisionally ranged under the Stylochidæ).

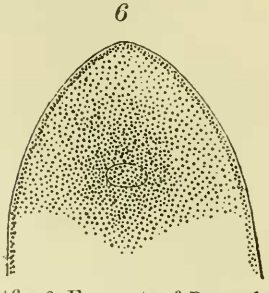
4. *Bergendalia diversa*, n. sp.

(Pl. II., fig. 15.—Textfigs. 6–8).

This new species is represented by two individuals which were captured at Shirahama in Prov. Awa near the low-tide mark, in the summer of 1906.

Body elongate-slender, moderately firm in texture, nearly uniformly broad for the most part of its length, narrowed at both its rounded or obtusely pointed ends. 35 mm. long by 6 mm. broad.

Dorsal surface of a grayish buff-pinkish colour, with a reddish median streak which laterally gradually disappears. Ventral surface much lighter coloured.



Textfig. 6. Eye-spots of *Bergendalia diversa*.

Tentacles wanting. Numerous marginal eye-spots present in a row or rows around the body; further, numerous eye-spots densely distributed all over the head end of body, as shown in text-figure 6.

Mouth situated slightly in front of the middle of body. Pharyngeal chamber with numerous lobed diverticula. Main gut running in the median line and

giving off numerous lateral intestinal branches; these repeatedly subbranch and anastomose, bringing about a network of rather narrow branchlets.

Three apertures open one behind another in the median line between the pharyngeal chamber and the posterior body end. The middle and the hindmost apertures are respectively the functional male and female openings, while the foremost may be called the duplicate male aperture. The functional male aperture (textfig. 7, 8, ♂) leads into the ciliated antrum musculinum (*am*), into which the small penis (*p*) projects vertically from above. The ejaculatory duct (*ed*), shortly after leaving the penis, divides into two ducts, dorsal and ventral. The former joins the anteriorly directed muscular prostate (*pr*), while the latter passes obliquely downward to bifurcate into two seminal canals (*sc*), without forming a seminal vesicle.

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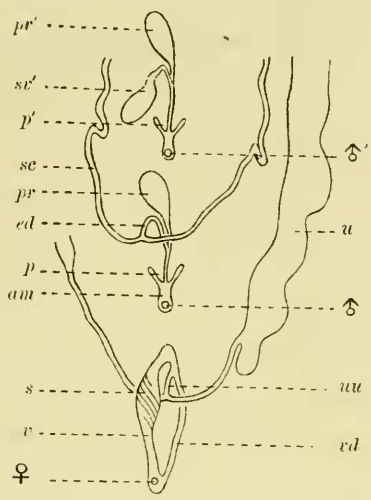

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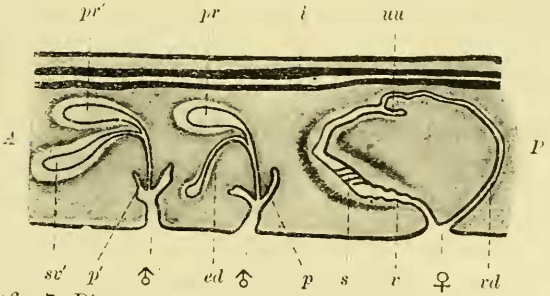

Textfig. 7. Diagrammatic representation of the genital end-organs of *B. diversa*, as seen from the ventral side.
Textfig. 8. Semidiagrammatic genital end-organs of *B. diversa* in sagittal section.
i intestine, *p'* duplicate penis, *pr'* prostate-like organ, *s* spiral coils of vagina, *sv'* seminal vesicle-like organ, *uu* unpaired uterine duct, *v* vagina, *vd* vaginal duct. ♂' duplicate male genital aperture.
Other letters as in textfig. 4.

The duplicate male organs bear a close resemblance to the functional described above. The external aperture (♂') leads into

a space which corresponds to the antrum musculinum and into which the relatively small duplicate penis (*p'*) projects vertically from above. A short distance from it, the ejaculatory duct divides into two, similarly as in the functional male system. The dorsal of the two ducts thus formed passes anteriorly into a prostate-like organ (*pr'*), while the ventral leads into a muscular-walled blind vesicle (*sv'*) corresponding to the seminal vesicle.

The female aperture (♀) leads into the vagina (*v*) which is extensively surrounded by numerous shell glands and which proceeds obliquely forward and upward for some distance, being twisted at a part of its course into a compact spiral coil of some five turns (*s*). It then bends backward, becomes gradually narrowed, and is soon joined on the ventral side by the single uterine duct (*uu*) coming from behind. Beyond this point the vagina runs backward and downward, describing an arched course, which part is known by the name of vaginal duct (*vd*). This finally opens into the antrum femininum closely behind the vaginal aperture and just inside the external female aperture. Thus the vagina and the vaginal duct together form a nearly complete, irregular circle. The unpaired uterine duct is very short and divides posteriorly into two tubular uteri (*u*), which run forward on either side outside the seminal canal and are more or less distended by the ova they contain.

This remarkable and interesting species may be said to closely agree with *Bergendalia anomala* Laidlaw (1903b) from Penang in all anatomical features, excepting the presence of eye-spots over the head-end surface and the duplicate penial organs being situated in front of, instead of behind, the functional penial organs. In our opinion, the difference may well be regarded as being of not more than specific value. The generic diagnosis of *Bergendalia*, hitherto known by the single species above referred to, should then be slightly modified to run somewhat as follows:

Craspedommata with elongate body, without tentacles. Marginal eyes in a crowded row or rows running completely round the body. With or without additional eye-spots distributed over head end. Pharynx large, much folded. Mouth subcentral. Three

genital apertures between mouth and posterior body end. Without true seminal vesicle. Prostate separated from ejaculatory duct and opening into it by a distinct duct. Penis unarmed. There occur a duplicate penial system either in front of or behind the functional. A part of vagina forming a prominent compact spiral coil. Vagina and vaginal duct running nearly in a circle and both opening into antrum femininum just within the external female aperture.

B. Section **SCHEMATOMMATA** Bock.

Family **Leptoplanidæ** Stimpson (Bock 1913 emend.).

Genus ***Notoplana*** Laidlaw 1903.

5. *Notoplana humilis* (Stimpson).

(Pl. II., fig. 6.—Textfigs. 9, 10).

Leptoplana humilis, Stimpson 1857, pp. 4, 9.—Diesing 1862, p. 533.—Lang 1884, p. 496.

The specimens, which we identify with *Leptoplana humilis* described by Stimpson from Hokkaido, is one of the commonest species in the neighbourhood of Misaki. Numerous specimens of the species have also been captured near the low-water mark at Shirahama in Prov. Awa and at Otaru in Hokkaido.

Body delicate, of an elongate shape in the creeping state, rounded at the anterior end, uniformly broad in most parts, gradually tapering to a blunt point at the hind end. Dimensions usually about 15 mm. long by 5 mm. broad, though largest individuals may reach 25 mm. in length.

Translucent; in dorsal view of an olive-buffy colour growing deeper towards median parts, partly due to the guts externally discernible with more or less distinctness; generally a light coloured longitudinal stripe present over the slightly folded pharynx. Testicular follicles and ovaries may appear as whitish spots. Ventral surface much paler than the dorsal. Genital end-organs also visible with moderate distinctness.

Tentacles small and somewhat rudimentary, bluntly pointed,

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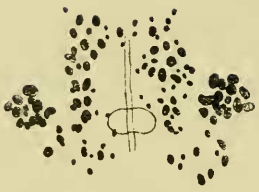

Textfig. 9. Eye-spots of *Notoplana humilis*.

situated at a distance of about 4 mm. from the anterior margin. Tentacular eye-spots in a crowded cluster at base of each tentacle; cerebral eye-spots scattered over the brain region on both sides of the median line (textfig. 9).

Mouth situated slightly in front of the centre of body. Pharyngeal chamber with some lobed diverticula. Main gut provided with numerous lateral branches, which subdivide but do not anastomose.

The seminal canals (textfig. 10, *sc*), running on either side of the pharynx, converge in front of the male genital opening and unite into an unpaired common canal, the ejaculatory duct. This makes a forward and upward bend and becomes continuous with the tubular seminal vesicle (*sv*) provided with muscular wall. The vesicle gradually narrows in its arched upward and backward course, and finally inserts itself into the pear-shaped prostate at the base. As is general in all species of the genus, the prostate (*pr*) consists of a number of saccular chambers arranged around the outer end of the ejaculatory duct and opening into this at the base of the small and rudimentary penial projection. The chambers number about six in the present species. The penis is without any trace of stylets. The antrum musculinum is nearly cylindrical and opens externally at its lower end, a short distance behind the pharyngeal chamber.

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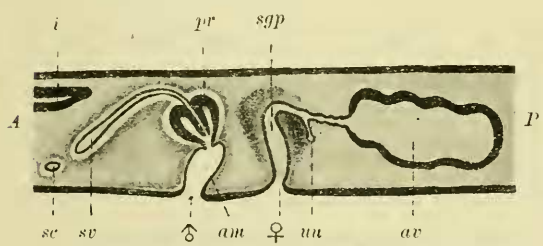

Textfig. 10. Semidiagrammatic representation of the genital end-organs of *N. humilis* in longitudinal section.
av accessory vesicle of vagina.
Other letters as in textfigs. 4 and 7.

The female aperture leads through the ciliated antrum into the shell-gland passage (*sgp*) which ascends vertically upward. The passage then bends backward, becoming gradually narrower at the

same time, and soon receives the common uterine duct (*uu*) on the ventral side. Beyond this point the passage is continued further backward but for a short distance as the duct of the accessory vesicle (*av*), which represents a swollen sac of an elongate shape. The common uterine duct divides, a very short distance from its junction with the shell-gland passage, into two lateral uterine ducts. These, extending anteriorly, skirt the pharyngeal folds and join together in the median line immediately in front of the pharynx.

The present species closely resembles in organization *Notoplana chierchæ* (Plehn 1896a) from Valparaiso, Chili, but may be distinguished from this by the different arrangement of eye-spots and by certain features of the male genital organs.

6. *Notoplana delicata*, n. sp.

(Pl. II., fig. 14.—Textfigs. 11–13).

This is a fairly common species in the neighbourhood of Misaki. Numerous specimens of the species were also collected at Shirahama, Prov. Awa, near the low-tide mark.

Body in the creeping state elongate, anteriorly broadly rounded, with lateral margins even and nearly parallel for a large part of the body-length, but tapering in the hind parts down to the bluntly pointed posterior end of body. It usually measures 27 mm. long by 5 mm. broad. The body is of a delicate texture.

Dorsal surface of the translucent body buffy, showing a brownish orange stripe in the median line from behind eye-spots to the posterior body end. Numerous scattered testes and ovaries are fairly well visible as whitish flecks. Ventral surface of a pale or weakly yellowish orange colour. On that side of body the pharynx and genital organs may be discerned with more or less distinctness.

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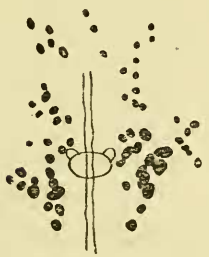

Textfig. 11. Eye-spots of *Notoplana delicata*.

Tentacles wanting. Tentacular and cerebral eye-spots (textfig. 11) blend together, but those posteriorly situated and of a somewhat larger size may be

regarded as the tentacular. The eye-spots are distributed on both sides of the brain which is positioned about 3 mm. from the anterior margin.

Seminal canals (textfig. 12, *sc*) of both sides continuous across the median line slightly behind the female genital opening, forming a loop. Anteriorly they extend to the level of the mouth, and then divide each into two limbs. One of these proceeds further forward, while the other turns abruptly backward and inward. The latter eventually unites with its mate of the other side in the median line and forms a short common duct, which soon passes from behind into the moderately large muscular seminal vesicle (textfig. 13, *sv*) situated behind the posterior end of pharynx. The anterior part of the seminal vesicle bends upward and backward, and is continuous with the slender ejaculatory duct (*ed*). This, after passing through the ovoid prostate (*pr*), pursues a somewhat tortuous course before entering the base of penis. The prostate is surrounded by a muscular sheath and contains seven small and slender chambers, which lie around the ejaculatory duct

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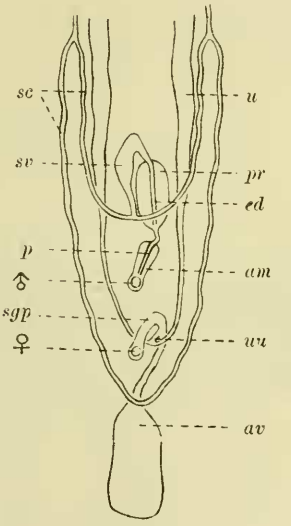

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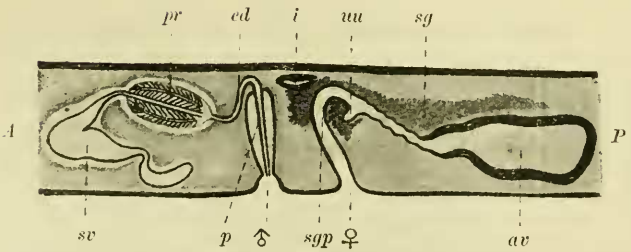


Textfig. 12. Diagrammatic combination figure of the genital end-organs of *N. delicata*, as seen from the ventral side.
Textfig. 13. Semidiagrammatic representation of the genital end-organs of *N. delicata* in sagittal section.
Index letters as in textfigs. 4, 7 and 10.

and open into this with their hind end. The penis is represented by a long chitinous stylet; it hangs down vertically in the ciliated tubular antrum musculinum, which opens to the exterior at the hind end of the third quarter of body.

The female genital organs consist of parts closely similar to those of the preceding species.

The present species seems to be nearly allied to *Notoplana vitrea* (Lang 1884) from Naples. But it may be distinguished from this species by the different arrangement of eye-spots as well as by the presence of a large accessory vesicle in the female genital system.

Genus ***Hoploplana*** Laidlaw 1902.

(Provisionally ranged under the Leptoplanidæ).

7. *Hoploplana ornata*, n. sp.

(Pl. II., fig. 7.—Textfigs. 14–16).

This new species is founded on two individuals which were obtained at Misaki near the low-tide mark.

Body broadly oval, with complete margin, dorsally slightly convex, rather firmly textured. Length 7 mm.; breadth 5 mm.

The dorsal surface shows very remarkable markings. Ground colour milky white or somewhat buffy, traversed by broad bands of a russet or brownish russet colour. In the median or central parts the bands reticulate, bringing about a limited number of unpigmented and unequal sized mesh-like spaces. From this irregular reticulum there start out radial bands which are about as broad as, or broader than, the interspaces between them and which reach right to the body margin. One of the bands is situated medianly at the anterior body end, while there exist a pair of them at the posterior, laterally to the median line. Ventral surface of a paler colour, revealing more or less distinctly the lobulated pharyngeal chamber in a whitish colour and also the pigmented bands seen on the dorsal side; testicular follicles visible as reddish spots.

Tentacles slenderly conical, destitute of pigments, each arising from a small unpigmented spot situated at about the posterior end of the first quarter of body.

14

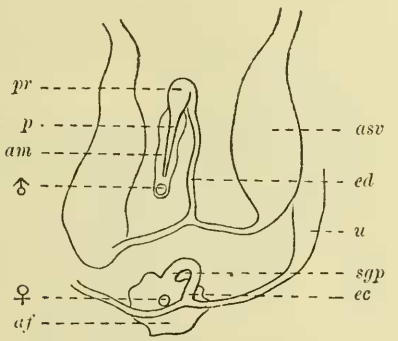
Textfig. 14. Eye-spots of *Hoploplana ornata*.

Tentacular eye-spots forming a complete circle at base of each tentacle; cerebral eye-spots in two groups closely inside the tentacular, each consisting of six or eight eye-spots; further, a single detached pair of eye-spots slightly in front of the cerebral groups (textfig. 14).

Mouth subcentral. Pharyngeal pocket with irregularly lobulated diverticula. Main gut giving rise to about 8 pairs of lateral intestinal branches.

The seminal canal, proceeding forward on either side, turns sharply round at the level of the mouth, then pursues a directly opposite course, and at the sides of penis distends into a large seminal vesicle (textfigs. 15, 16, *asv*). From the posterior end of this springs a slender duct, which passes inward towards the midian line and fuses with its fellow of the opposite side at a point closely behind the penis, to form an unpaired median duct (*ed*). This duct proceeds anteriorly for some little distance, then bends downward and plunges at once into the small prostate (*pr*) lying at the base of penis. The penis is represented by a slender horny stylet, disposed obliquely downward and backward in the ciliated tubular antrum musculinum (*am*), which opens externally by the male aperture,

15



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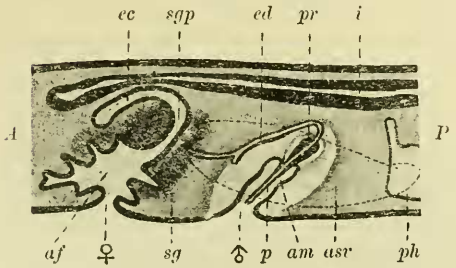


Textfig. 15. Diagrammatic combination figure of the genital end-organs of *H. ornata*, as seen from the ventral side.

Textfig. 16. Genital end-organs of *H. ornata* in longitudinal section. Semidiagrammatic.

af antrum femininum, *asv* accessory seminal vesicle, *ph* pharyngeal pocket.

Other letters as in textfig. 4.

situated slightly behind the posterior end of the second quarter of body.

The uteri, originating at the level of mouth, run backward and join together, at a point nearly above the female genital opening, to form the median egg-canal (*ec*). This proceeds forward for a short distance, then bends downward, and after receiving numerous shell glands (*sg*), opens into the spacious antrum femininum (*af*) from front. The antrum is supplied with irregular outbulgings and is lined with a ciliated epithelium.

Family **Planoceridæ** LANG.

Genus ***Neoplanocera***, n. gen.

8. ***Neoplanocera elongata***, n. sp.

(Pl. II., fig. 4.—Textfigs. 17–19).

This new genus and species is based on five individuals obtained at Shirahama and Sunosaki in Prov. Awa, at the low-tide mark.

Body elongate-oval, nearly uniformly broad in the greater part of its length, more broadly rounded at the anterior than at the posterior end. 35 mm. long by 10 mm. broad.

Dorsal surface of an olive-buffy colour, with an ill-defined reddish median stripe over the pharynx. Ventral surface much paler than the dorsal.

17

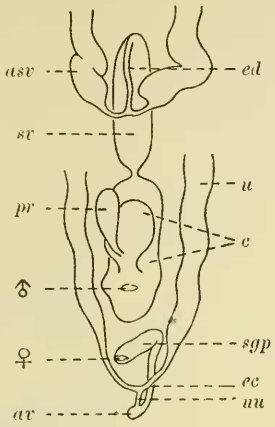
Textfig. 17. Eye-spots of *Neoplanocera elongata*.

Tentacles absent. Tentacular and cerebral eye-spots (textfig. 17) of each side blend together; the former are on the whole somewhat larger than the latter; both forming an irregular cluster on either side of the median line.

Mouth placed nearly in the centre of the ventral surface; pharyngeal pocket with numerous irregularly lobed diverticula, corresponding in a general way to the folds of pharynx.

Seminal canals, running backward along the sides of pharyngeal pocket, form on each side a slightly convoluted widening of the nature of accessory seminal vesicles (textfigs. 18, 19, *asv*). Posteriorly they join into a single median duct (*ed*) at a point far in front of the male aperture. The median duct, after running anteriorly for a short distance, enters the seminal vesicle at its anterior end. The seminal vesicle (*sv*) is an elongate-ovoid muscular organ, imbedded in the parenchyma of the dorsal parts of body. After emerging from this at the opposite end, the duct directly enters the muscular wall of the somewhat ellipsoid cirrus (*c*) and opens at the tip of a small conical and posteriorly directed process projecting into the cirrus cavity. The surface of the latter as well as that of the process just mentioned is beset with stiff chitinous bristles. The cirrus cavity forms some irregular outbulgings and leads to the exterior, through the tubular antrum musculinum (*am*), at a point behind the pharyngeal sac. The prostate (*pr*) is a pyriform muscular organ lying beneath the cirrus and opens behind into a ventral outbulging of the floor of cirrus cavity.

18



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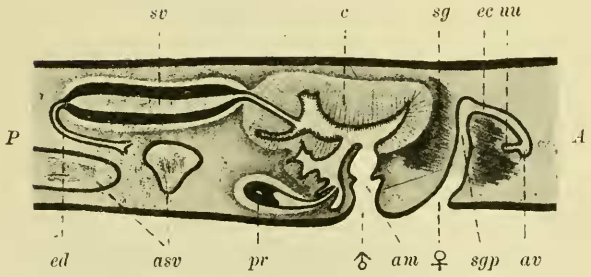

Textfig. 18. Diagrammatic representation of the genital end-organs of *N. elongata*, as seen from the ventral side.
Textfig. 19. Genital end-organs of *N. elongata* in sagittal section. Semidiagrammatic.
c cirrus.
Other letters as in textfigs. 4, 7 and 10.

The uteri (*u*), after running along the sides of the pharyngeal pocket, extend further backward and join together into a short common uterine duct (*uu*), which joins the median egg-canal (*ec*) at its posterior end. The accessory vesicle (*av*) is exceedingly small and rudimentary. The egg-canal pursues a somewhat tortuous course obliquely forward and upward for a short distance, and then making a sharp downward bend, expands into the vaginal canal (*syp*) surrounded by numerous shell glands (*sy*). The vaginal canal opens to the exterior at a position closely behind the male aperture.

The present interesting species seems to be somewhat related to *Disparoplana dubia* Laidlaw (1903c), but stands distinctly at variance from this chiefly in the ventral position of the prostate, not to speak of minor points of differences. It seems to us that the differences are of sufficient value to separate the two forms generically.

Genus ***Planocera*** De Blainville 1828.

9. *Planocera reticulata* (Stimpson).

(Pl. I., fig. 4.—Textfigs. 20–22).

Stylochus reticulatus, Stimpson 1855, p. 381.—Diesing 1862, p. 569.
Stylochoplana reticulata, Stimpson 1857, pp. 4, 11.
Planocera reticulata, Lang 1884, pp. 445.

The species which we identify with Stimpson's *Stylochus reticulatus*, described by that author from the Loo-choo Islands, is exceedingly common in the neighbourhood of Misaki. It can be collected there in abundance from the underside of loose stones or pieces of rock between the tide-marks.

Body broadly oval, leaf-like but rather thick and of a moderately firm texture, reaching about 80 mm. in length and 45 mm. in breadth. One of the smallest individuals with developed genital end-organs measured only 10 mm. long by 6 mm. broad.

General colour of body subject to considerable variation according to both age and individuals. The body grows intransparent as the body increases in size and thickness. Usually the dorsal surface appears more or less dark on account of blackish

punctate pigments present all over in reticular distribution, leaving numerous small mesh-spaces free of them. The pigments are most densely developed over the pharynx and the genital end-organs. Gut branches may be discerned on the dorsal side in a pale brownish colour. In mature specimens, there are visible behind the pharynx, two ill-defined streaks of a reddish colour, converging posteriorly and marking the position of uteri. The ventral surface is of a much paler colour than the dorsal, without blackish pigments. The much folded pharynx, the seminal canals, the muscular vagina bulbosa and the radiating shell glands can be seen with more or less distinctness in a whitish colour on that side.

Dorsal tentacles slenderly conical, dark-coloured, situated at about the hind border of the first quarter of body. Normally they occur in a single pair; but, as the individuals grow old and large, there may take place adventitious production of some new dorsal tentacles close to the normal; so that, in large examples there may exist, on both sides or on one side only, a group of more than one tentacles arranged apparently without definite order. In a case which came under observation there existed on the left a group of four tentacles and on the right another of seven.

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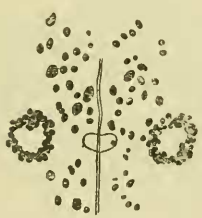
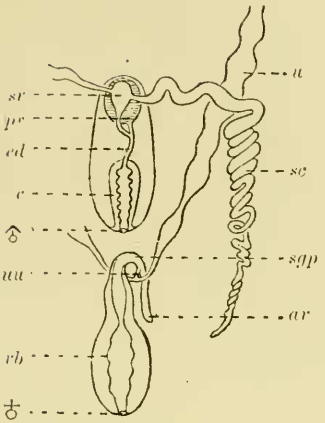


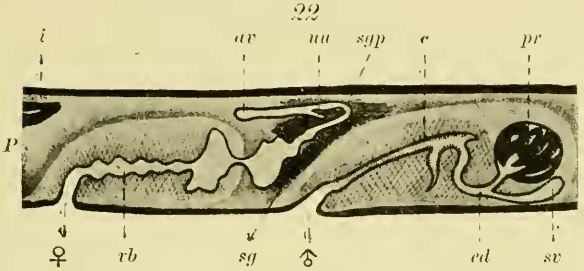
Textfig. 20. Eye-spots of *Planocera reticulata*.

Tentacular eye-spots in a close ring at base of each tentacle. Cerebral eye-spots irregularly scattered and scarcely separable into distinct groups.

Mouth subcentral, opening into the much folded pharynx. Main gut giving rise to six pairs of intestinal branches.

Testes distributed in ventral parts in the body. Seminal canals (textfig. 21, *sc*) are much convoluted tubes, which, beginning at about the level of the female genital aperture, extend anteriorly on either side, taking a course nearly parallel to the median line up to about the level of the anterior end of the cirrus bulb. There they bend mediad, finally to join the seminal vesicle (textfig. 22, *sv*) which is situated immediately behind the pharyngeal sac and ventrally to the hind end of prostate. Posteriorly the seminal





Textfig. 21. Diagrammatic combination figure of the genital end-organs of *Pl. reticulata*, as seen from the ventral side.
Textfig. 22. Genital end-organs of *Pl. reticulata* in longitudinal section. Semidiagrammatic.
vb vagina bulbosa.
Other letters as in textfigs. 4, 7, 10 and 18.

vesicle gives rise to the ejaculatory duct (*ed*), which, after receiving the short duct of the prostate, bends dorsalward and then opens into the cirrus cavity. The prostate (*pr*) is a spherical body much larger than the seminal vesicle, and is imbedded, together with the latter, in the muscular sheath of cirrus dulb; the internal thick and glandular epithelium of the cirrus is thrown into much folds. Cirrus (*c*) large, somewhat cylindrical; the internal epithelium of cirrus cavity beset with chitinous bristles, which, on protrusion of the cirrus, would cover the entire external surface of that organ. Male genital aperture situated at about the posterior end of the middle third of body.

Ovaries distributed in the dorsal parts. The two uteri (*u*) extend posteriorly from the sides of the hind parts of pharyngeal sac, clasping between them the cirrus bulb and converging together all the while. At their hind end they are thin tubes and unite, at a dorsal position nearly above or somewhat behind the male genital opening, into a short posteriorly directed median tube (*uu*), which joins another median tube on the ventral side. This leads posteriorly into the blind accessory vesicle (*av*) and anteriorly into

the shell-gland passage (*sgp*). The former is of a tubular shape, its blind hind end lying at a position dorsal to the anterior end of vagina bulbosa (*vb*). The latter, after proceeding a short distance anteriorly from the junction point of the unpaired uterus, bends inferiorly, then to pursue an obliquely postero-ventral course surrounded by the shell glands (*sg*) and along the postero-dorsal side of cirrus cavity. In its inferior parts the shell-gland passage is much widened and presents an irregular contour. It opens into the large vagina bulbosa at the anterior end. The bulbosa is provided with a strongly muscular sheath, the wall of its cavity thrown into much folds. Female aperture situated in the penultimate fifth of body.

The species seems to be nearly allied to *Planocera hawaiiensis* described by Heath (1907) from the Sandwich Islands, but may be distinguished from it by the colouration of body and by the entire absence of chitinous penial hooks.

In 1907 Meixner ('07b) described a worm from the Gulf of Tadjourrah, which he identified with *Stylochus reticulatus* Stimpson though with some doubt. To us it appears, judging from the description and figures given by him, the worm in question is certainly a *Stylochus* but probably represents a distinct species. It should not therefore be confounded with the Misaki form described above.

10. *Planocera purpurea*, n. sp.

(Pl. I., fig. 7. —Textfig. 23).

Numerous specimens of this apparently new species have been obtained at the low-water mark in the neighbourhood of Misaki as well as of Shirahama in Prov. Awa.

Body oval, reaching 20 mm. in length and 13 mm. in breadth. Dorsal surface of a dark purplish colour, darker in the median parts; main gut and its dendritic branches obscurely showing themselves in a brownish colour. Immediately behind main gut and at about the hind end of the third quarter of body, a pale unpigmented space marks the position of genital organs; in mature individuals, uteri discernible in a reddish colour on either side of that space, as in the preceding species.

Dorsal tentacles conical, of the same colour as body, situated each on a clear spot at the hind end of the first quarter of body. Tentacular group of eye-spots arranged in a circle at base of each tentacle. Cerebral eye-spots in two paired groups as shown in the adjoining figure (textfig. 23).

23

Textfig. 23. Eye-spots of *Planocera purpurea*.

In structural respects this species closely resembles the preceding. At first we were inclined to hold that we had before us simply certain small individuals of *Pl. reticulata*. However, the constant association of the small body size with the peculiarities noted above has led us to specifically separate the form from that species.

Genus ***Paraplanocera*** Laidlaw 1903.

11. ***Paraplanocera misakiensis***, n. sp.

(Pl. II., fig. 5.—Textfigs. 24–26).

A single representative of this new species was captured between the tide-marks in the neighbourhood of Misaki.

Body oval or broadly elliptical, with frilled margin, measuring 30 mm. long by 25 mm. broad.

Colour of dorsal surface olive-buffy, dotted irregularly with a large number of minute milky white spots, intermingled with some others of a dark brownish colour. Besides, there exist all along the body margin numerous minute yellow and white dots in a single or more rows. Gut branches may be well discerned on the dorsal surface. Ventral surface similar in colour to the dorsal, but without the pigment spots; the pharynx visible in the median line as a milky white space; male and female genital end-organs also discernible to a certain extent.

24

Textfig. 24. Eye-spots of *Paraplanocera misakiensis*.

Dorsal tentacles small, conical, yellowish in colour, situated at about one-third the length of body from the anterior margin.

Tentacular eye-spots form a complete circular group at base of each tentacle;

cerebral eye-spots in two distinct elongate clusters on either side of the median line (textfig. 24).

Mouth subcentral ; pharynx much folded. Primary gut-branches occur in about six pairs.

Testes ventrally situated. Seminal canals (textfig. 25, *sc*) gradually diverge forward until the level slightly anterior to male genital end-organs is reached, where they bend abruptly upward and backward to expand into the accessory seminal vesicle (*asv*) just before piercing the muscular sheath of the prostate. Within that sheath the canals unite at once into an unpaired median canal, the ejaculatory duct (*ed*), which opens into the duct of the prostate (*pr*). This organ is a large spherical body with muscular sheath, which is directly continuous behind with that of the cirrus cavity (*c*). The inner surface of this is beset with minute bristles. The male aperture is situated in the third quarter of body.

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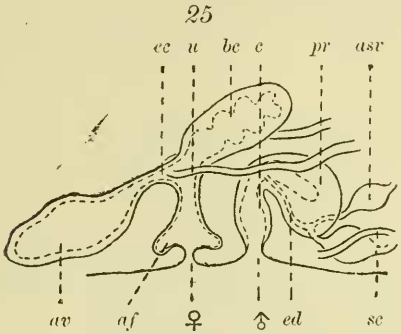

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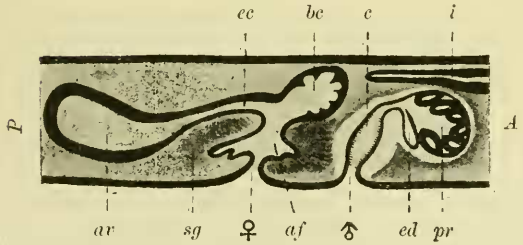

Textfig. 25. Diagrammatic combination figure of the genital end-organs of *P. misakiensis*, as seen from the right side.

Textfig. 26. Genital end-organs of *P. misakiensis* in longitudinal section. Semidiagrammatic.
bc bursa copulatrix.
Other letters as in textfigs. 4, 10, 15 and 18.

Ovaries situated dorsally. The two uteri (*u*) run backward parallel with the median line, and finally open separately into a median canal, the egg-canal (*ec*). This canal is posteriorly continuous with the accessory vesicle (*av*), which is filled with spermatozoa. Anteriorly, it expands into the bursa copulatrix (*bc*), which is provided with a strongly developed muscular sheath and with a more or less folded epithelium. The bursa copulatrix

leads into the annularly outbulging antrum femininum (*af*), which is surrounded by numerous shell glands (*sg*). The female aperture lies closely behind the male.

The present species seems to be nearly allied to both *Paraplanocera rotumanensis* LAIDLAW (1903a) and *P. discus* (WILLEY 1897), but may be distinguished from the former by certain features of cerebral eye-spots and of genital organs, and from the latter chiefly by the different colouration of body and the entire absence of the two peculiar glands connected with the antrum musculinum.

Family **Diplosolenidæ** BOCK.

This family was recently instituted by BOCK to receive the genus *Diplosolenia* HASWELL. We think that the new genus described below by the name of *Pseudostylochus* as well as STIMPSON's old genus *Callioplana* may be ranged under the family, under which circumstance the family diagnosis as given by BOCK requires emendation. It may be made to run somewhat as follows:

Schematommata with oval body. Tentacles present. Tentacular and cerebral eyes in distinct clusters. Mouth subcentral. Pharyngeal chamber much folded in relation to plicated pharynx. Prostate a free saccular body opening into ejaculatory duct. With either true or accessory seminal vesicle. Penis armed or not armed. Without vagina bulbosa. Accessory vesicle of vagina single or paired.

Genus ***Pseudostylochus***, n. gen.

Diplosolenidæ with oval body. Tentacles small and indistinct. With true seminal vesicle. Prostate situated dorsal to seminal vesicle. Penis unarmed. Accessory vesicle of vagina single, large.

This new genus agrees with Stylochid-genera in the general plan of genital end-organs, but differs from them chiefly in the total absence of marginal eyes, in which respect it more nearly approaches both *Diplosolenia* HASWELL and *Callioplana* STIMPSON.

12. ***Pseudostylochus takeshitai***, n. sp.

(Pl. II., fig. 11.—Textfigs. 27–29).

Numerous specimens of this species were obtained at the low-water mark in the neighbourhood of Matsuwa, near Misaki.

Body oval, more broadly rounded anteriorly than posteriorly, measuring 18 mm. long by 9 mm. broad.

Colour of dorsal surface buffy, darker in the median parts over the position of pharynx, uniformly dotted all over with minute brown spots. Ventral side much paler; pharynx and reproductive system discernible with moderate clearness on this side.

27

Textfig. 27. Eye-spots of *Pseudostylochus takeshitai*.

Tentacles very small, bluntly conical, transparent, unpigmented, situated at about the hind border of the first fourth of body.

Tentacular eye-spots forming an irregular compact group at base of each tentacle. Cerebral eye-spots irregularly scattered over the brain region in two lateral groups (textfig. 27). Without marginal eye-spots.

Mouth situated nearly in the centre of ventral surface; pharyngeal pocket with 8–12 pairs of irregularly lobed diverticula corresponding to the folds of pharynx. Main gut giving rise to 8 pairs of lateral intestinal branches.

Seminal canals (textfig. 28, *sc*) are distinct unbranched canals, continuous across the median line behind the female genital aperture. From that point they run forward, gradually diverging until about the middle of body, where each forms a loop to pursue a backward course nearly parallel to, and on the inner side of, its outer parts. In front of penis the canals unite into a single short duct which joins the spherical seminal vesicle (textfigs. 28, 29, *sv*) from behind. Posteriorly the vesicle gives rise to the ejaculatory duct (*ed*), which, after pursuing a backwardly, and then upwardly directed, tortuous course, receives the opening of the oblong

prostate (*pr*). After this it proceeds further backward, finally to open on the underside of the tip of penis (*p*). The intromittent part of the penis is large, cylindrical in shape and horizontally disposed in the penis sheath. The extreme tip of penis, behind the terminal part of the ejaculatory duct, contains a vertically disposed pad of connective tissue. On account of the presence of that peculiar pad, the part of the ejaculatory duct lying in front of it presents, in horizontal sections, a lumen of crescentic outline. The thick wall of penis consists of three muscular layers, circular, longitudinal and diagonal. Antrum with an annular outbulging. External male aperture on the hind border of the third quarter of body.

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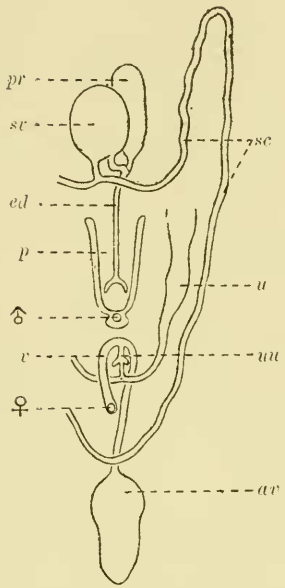

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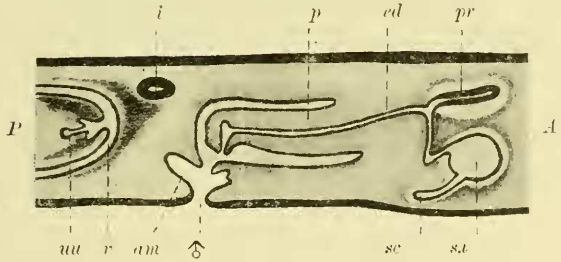

Textfig. 28. Diagrammatic representation of the genital end-organs of *P. takeshitai*, as seen from the ventral side.

Textfig. 29. Genital end-organs of *P. takeshitai* in sagittal section. Semidiagrammatic.

Index letters as in textfigs. 4, 7 and 10.

The female aperture, situated a short distance behind the male end-organs, leads into the vagina (*v*), which runs obliquely foreward and dorsalward for some little distance, and then, after receiving the unpaired uterine duct (*uu*) from behind, runs backward to join the large elliptical accessory vesicle (*av*). The vaginal canal is surrounded by shell-glands, especially numerously in the neigh-

bourhood of the junction of the uterine duct. This short duct shows, in the middle of its course, an obliquely posteriorly directed annular outbulging; thus, there arises a small conical and anteriorly directed process which projects into a swelling of the lumen and is axially traversed by a part of the duct. At its hind end the unpaired uterine duct divides into two uteri (*u*). These extend forward, running parallel to the outer limbs of seminal canals, and finally join together in the median line in front of the pharynx.

13. *Pseudostylochus fulvus*, n. sp.

(Pl. II., fig. 10.—Textfigs. 30–32).

Numerous specimens of this new species were captured about the low-tide mark in the neighbourhood of Misaki.

Body broadly oval, the anterior end being somewhat broader than the posterior, reaching 11–13 mm. in length and 5–6 mm. in breadth.

Ground colour of dorsal surface buffy, medianly darker in the pharyngeal region, densely dotted with minute brownish orange pigments.

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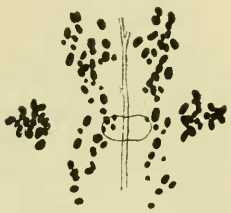


Textfig. 30. Eye-spots of *Pseudostylochus fulvus*.

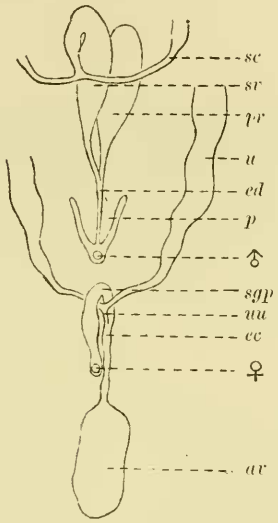
Tentacles indistinct, bluntly conical, situated at about the hind border of the first quarter of body, about 1 mm. apart.

Tentacular eye-spots confined to base of each tentacle, forming an irregular group. Cerebral eye-spots in two elongate tracts over the brain region and on either side of the median line (textfig. 30).

As in the preceding species, the seminal canals (textfigs. 31, 32, *sc*) unite, after running backward on either side of the median line, into an unpaired common duct slightly in front of the penis. (*p*). That duct runs foreward, bends abruptly backward and joins the tubular seminal vesicle (*sv*) with muscular wall. The vesicle continues into a slender ejaculatory duct (*ed*) which pursues a somewhat tortuous course to open at the tip of penis. At the base

of penis, it receives the duct of the prostate, placed dorsally to the seminal vesicle. The prostate (*pr*) is a muscular organ of an elongate pyriform shape. The conical intromittent part of penis is subvertically disposed in its sheath, which opens directly to the exterior by the male genital pore.

31



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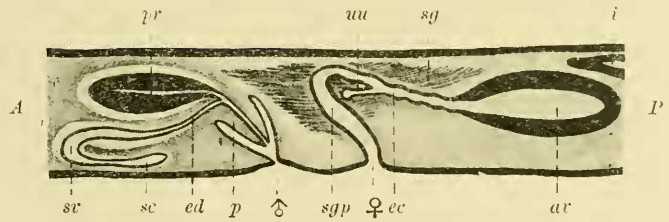

Textfig. 31. Diagrammatic representation of the genital end-organs of *P. fulvus*, as seen from the ventral side.
Textfig. 32. Semidiagrammatic representation of the genital end-organs of *P. fulvus* in longitudinal section.
Index letters as in textfigs. 4, 7 and 10.

The female genital aperture leads into the tubular antrum femininum or shell-gland passage (*sgp*), which pursues an upward and somewhat forewardly oblique course, at the end of which it makes an abrupt turn backward, to continue itself as the egg-canal (*ec*). This receives in its course the common uterine duct (*uu*) and finally passes over into the large accessory vesicle (*av*) of an oblong-ovoid shape.

The present species closely resembles the preceding in external features. But it differs from this, amongst other points, in the arrangement of the parts of the male genital organ.

14. ***Pseudostylochus obscurus*** (Stimpson).

(Pl. I., fig. 10.—Textfigs. 33, 34).

Stylochus obscurus, Stimpson 1857, pp. 4, 11.—Diesing 1862, p. 566.—Lang 1884, p. 464.

Numerous specimens of what we are inclined to identify with Stimpson's *Stylochus obscurus* were obtained between the tide-marks at Misaki, at Mera in Prov. Awa, and also at Otaru in Hokkaido. Stimpson gave the sublittoral zone of Hokkaido ("Yesso") for the habitat of *Stylochus obscurus*. In our opinion the species should be placed under the new genus *Pseudostylochus*.

Body oval or elliptical, moderately firm, and usually measuring 20 mm. long by 15 mm. broad.

Ground colour of dorsal surface deep olive-buffy, dotted all over with minute dark greenish pigments. A darkish median stripe occupies the region of pharynx. Stimpson has given the colour of the species to be bluish gray and blotched with blackish pigment spots. Ventral surface grayish or pale, unpigmented; the lobed pharynx and the reproductive system visible with more or less distinctness in a whitish colour.

Tentacles small, bluntly conical; each situated on the posterior border of the first quarter of body.

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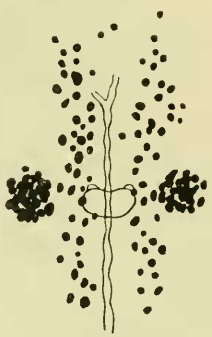


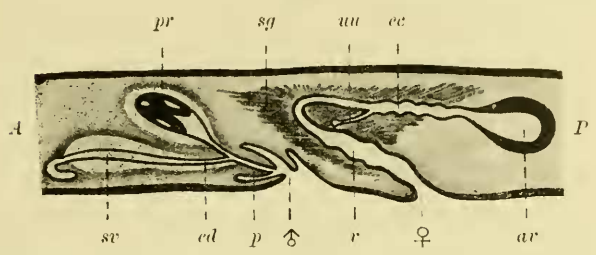
Textfig. 33. Eye-spots of *Pseudostylochus obscurus*.

Tentacular eye-spots forming a crowded group at the base of each tentacle. Cerebral eye-spots in an elongate tract on either side of the median line. No eye-spots elsewhere on the body (textfig. 33).

Mouth placed nearly in the centre of the ventral surface. Pharyngeal pocket with some irregularly lobed diverticula. Main gut provided with about 10 pairs of lateral intestinal branches which show no sign of anastomosis.

Genital organs (textfig. 34) are essentially in accord with those of the preceding species. The seminal canals join into a single

duct which pursues a short sinuous course before entering the seminal vesicle (*sv*) at the anterior end. The vesicle gives rise to the ejaculatory duct (*ed*), which, after receiving at base of penis (*p*) the duct of the muscular elongate-ovoid prostate (*pr*), proceeds backward to open at the tip of penis. The small conical penis is nearly horizontally disposed in the antrum musculinum.



Textfig. 34. Genital end-organs of *P. obscurus* in sagittal section. Semidiagrammatic.
Index letters as in textfigs. 4, 7 and 10.

The comparatively small pear-shaped accessory vesicle (*av*) gives rise anteriorly to the median egg-canal (*ec*). After receiving the unpaired uterine duct (*uu*), the egg-canal extends a short distance further foreward, surrounded by numerous shell glands (*sg*); it then bends abruptly ventrad and backward to expand into the vagina (*v*). The unpaired uterine duct divides into two uteri, which run anteriorly along the margin of pharyngeal sheath on either side and join together in the median line in front of the pharynx.

As will be seen from the above description, the present species resembles *Pseudostylochus fulvus* previously described, but may be distinguished from this by the difference in colour and size of body as well as in certain characteristic points of genital organs.

Genus ***Callioplana*** Stimpson 1857 (emend.).

This genus, represented by the single species *C. marginata* described from "Ousima" by Stimpson, has since been considered by authors to be identical with either *Stylochus or Planocera*. From our own study of what may be regarded to be the Stimpson's genus and species, we are inclined to keep up the genus. It may safely be stated that it should be ranged under the *Diplosolenidæ*, although it shows some points of resemblance to *Woodworthia* of the *Stylochidæ*.

15. *Callioplana marginata* Stimpson.

(Pl. I., fig 1.—Textfigs. 35–37).

Callioplana marginata, Stimpson 1857, pp. 4, 11.
Stylochus marginatus, Diesing 1862, p. 569.—Meixner, 1907, p. 103.
Planocera (?) *marginata*, Lang 1884, p. 445.

A large number of specimen referable to this species were collected between the tide-marks at both Misaki and Sunosaki.

Body oval with frilled margin, leaf-like though somewhat elevated in the dorsal median parts. Large individuals may reach 50 mm. in length and 30 mm. in breadth, while one of the smallest measured only 15 mm. long by 7 mm. broad.

Colour of dorsal surface velvety black, bordered all around with a narrow band of tawny brown just inside the colourless margin. Ventral surface much paler than the dorsal, and revealing pharynx and reproductive system to a certain degree in a whitish colour.

Nuchal tentacles conical, orange-coloured in the distal and colourless in the basal parts; each situated on a clear spot about the hind border of the first fifth of body.

35

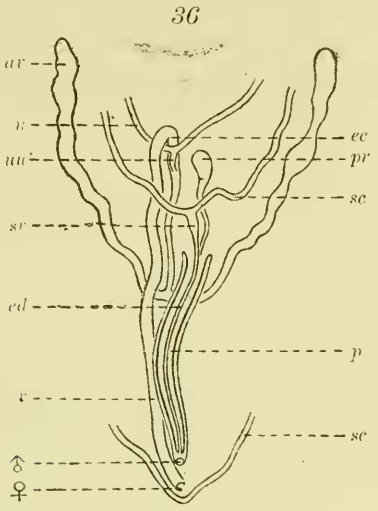
Textfig. 35. Eye-spots of *Callioplana marginata*.

Tentacular eye-spots forming a group in the basal parts of each tentacle; cerebral eye-spots distributed in an elongate tract on each side (textfig. 35).

Mouth situated nearly in the centre of body. Pharyngeal sheath provided with numerous lobed diverticula corresponding in a general way to the folds of pharynx. Main gut produced into about 7 pairs of lateral intestinal branches, the final branchlets of which but rarely anastomose.

Testes ventrally situated. Seminal canals (textfig. 36, *sc*) form a V-like loop closely behind the female genital opening; anteriorly at the anterior border of the second quarter of body the two limbs of the loop bend sharply inward and backward, forming inner limbs which run parallel to the outer and converge in front of the penis to join the slightly distended and non-muscular seminal

vesicle (textfig. 37, *sv*). Posteriorly this is continuous with the very long and thin ejaculatory duct (*ed*), finally opening at the tip of the slender penis. The prostate (*pr*) is of an ovoid shape and is situated immediately anterior and dorsal to the seminal vesicle; its posteriorly directed duct passes dorsal to the ejaculatory duct and opens at the apex of penis together with the ejaculatory duct. The intromittent part of the penis (*p*) is very long and slenderly cylindrical; it is unarmed. The penis sheath is tubular in accordance with the shape of penis, and opens the external aperture at its hind end, at a distance of about 10 mm. from the posterior body extremity.



Textfig. 36. Diagrammatic representation of the genital end-organs of *C. marginata*, as seen from the ventral side.

Textfig. 37. Genital end-organs of *C. marginata* in longitudinal section. Semidiagrammatic.

prd prostatic duct.

Other letters as in textfigs. 4, 7 and 10.

The ovaries are largely dorsal in position. The uteri (*u*), after running closely along the pharynx, unite with each other and form the unpaired uterine duct (*uu*) above the prostate (*pr*); the duct soon joins the egg-canal (*ec*). From this junction point the egg-canal extends posteriorly to the point of its origin by union of the two accessory vesicles (*av*), which anteriorly extend up to the level of the mouth. Anteriorly the egg-canal makes an abrupt downward and backward bend and then continues as a long and posteriorly directed vaginal passage (*v*), abundantly supplied with

shell glands (*sg*). The passage runs immediately dorsal to the penis sheath, to open to the exterior close behind the male aparture.

Suborder **COTYLEA** Lang.

Family **Pseudoceridæ** Lang.

Genus ***Thysanozoon*** Grube 1840.

16. ***Thysanozoon brocchii*** (Grube).

(Pl. I., fig. 11).

Thysanozoon brocchii, Lang 1884, pp. 525–536.

The species of *Thysanozoon* found fairly commonly in the neighbouring coasts of Misaki and Matsuwa, we are inclind to hold to be specifically inseparable from *Th. brocchii* of the Mediterranean.

Body broadly oval, leaf-like, with somewhat frilled margin. Characteristic is the presence of numerous small, slenderly conical papillæ all over the dorsal surface. Generally speaking, they are best developed in the middle parts, and grow smaller and more apart from one another towards the body margin. Large specimens with completely developed genital end-organs reach 35 mm. in length and 21 mm. in breadth.

Colour of dorsal surface purplish gray or yellowish purple, with a whitish or yellowish median stripe running posteriorly from behind cerebral eyes. The dorsal papillæ are generally of a dark grayish colour with a tint of purple, except at the base which is colourless. Frequently they exhibit a few number of white dots near the tip. In some of the specimens, which came under our observation, the papillæ were in part of a whitish or yellowish colour in the median longitudinal or in the middle transverse zone of the body. Ventral surface much lighter-coloured than the dorsal, somewhat darkish along the margin, but nowhere with pigments.

Marginal tentacles appear as fleshy outgrowths of the anterior margin of body.

Numerous eye-spots distributed on the tentacles; cerebral

eye-spots occurring over the brain region in two approximated clusters on a colourless area.

A sucker present nearly in the centre of the ventral surface. Mouth at about the hind end of the first fifth of body. Pharynx much plicated. Main gut extending from pharyngeal chamber behind nearly to the posterior body end. Lateral intestinal branches anastomose and are continued into dorsal papillæ without opening to the exterior.

A pair of male genital apertures on either side of the median line, closely behind the pharyngeal chamber. Slightly behind them occurs the single female aperture. Parts of internal genital organs quite as known from the Mediterranean examples.

Genus ***Pseudoceros*** Lang 1884.

17. ***Pseudoceros reticulatus***, n. sp.

(Pl. I., fig. 3.—Textfigs. 38, 39).

Numerous specimens of this species were obtained between the tide-marks at both Misaki and Shirahama.

Body somewhat oval, leaf-like with strongly crenulated margin, very delicate in texture. Length 38 mm.; breadth 15 mm.

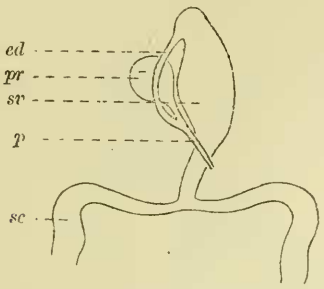
Dorsal surface showing all over a coarse reticulum of broad olive-gray bands, with a number of much lighter coloured mesh-like spaces of moderate sizes. Minute black pigment dots scattered almost uniformly all over the surface. The reticulating bands run into a dark median band over the main gut; this band, in its turn, contains a median series of short and small colourless stripes. Ventral surface pale.

Marginal tentacles appearing as flap-like projections of the frontal margin. Numerous eye-spots scattered on both dorsal and ventral surfaces of marginal tentacles; cerebral eye-spots forming a single group in a round clear spot a short distance behind the tentacles.

A sucker situated in the centre of body. Mouth in the anterior body parts closely behind the brain; pharynx frizzled-like in appearance. Main gut extending nearly to the posterior body end.

The testes are placed in the ventral half of body; the sperm canals proceeding from them appear to form an anastomosing system. The seminal canals (textfig. 38, *sc*), coming from behind, unite in front of the female genital organs into a median canal, which is continuous with the muscular seminal vesicle (textfig. 39, *sv*). Anteriorly this vesicle gives rise to a slender duct, the ejaculatory duct, which pursues a somewhat S-like course on the right side of the prostate (*pr*), and after receiving the duct of this organ enters into the penis. The pyriform prostate lies just dorsal to the base of penis (*p*), which is represented by a horny stylet hanging vertically in the sheath. The antrum musculinum (*am*) forms an obliquely upwardly directed, annular outbulging before it opens externally. The external aperture lies in the median line, closely behind the pharyngeal chamber, the male end-organs being present in a single set.

38



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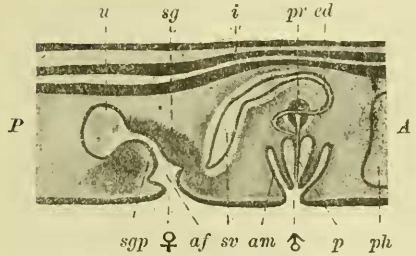


Textfig. 38. Diagrammatic figure of the male genital end-organs of *Pseudoceros reticulatus*, as seen from the ventral side.

Textfig. 39. Genital end-organs of *P. reticulatus* in longitudinal section. Semidiagrammatic. Index letters as in textfigs. 4, 10 and 15.

The ovaries are dorsally situated and are joined to the uteri by an indistinct system of anastomosing canals. The two uteri, filled with ova, meet in the median line to communicate with the shell-gland passage (*sgp*), which proceeds obliquely anteriorly and ventrally and distends itself to form the antrum just before opening externally behind the male aperture.

18. *Pseudoceros lacteus* (Collingwood)?

(Pl. I., fig. 6).

Sphyngiceps lacteus, Collingwood 1876, p. 90.
Pseudoceros (?) *lacteus*, Lang 1884, p. 548.

Two individuals, not improbably referable to this species, were found attached to brown algæ between the tide-marks at Misaki.

Body oval, with frilled margin, reaching 20 mm. in length and 10 mm. in breadth.

Dorsal surface rosy colour with a number of scattered blackish spots of a moderate size and a lightly coloured median stripe extending posteriorly from behind cerebral eye-spots; with a blackish marginal and a russet brown submarginal band all around. Ventral surface pale, revealing the same marginal and submarginal bands seen on the dorsal side.

Marginal tentacles represented by folded flaps of the anterior margin, which flaps are provided with numerous eye-spots on both dorsal and ventral sides. Cerebral eye-spots in a median, roundish, clear space behind the tentacles.

Sucker nearly in the centre of ventral surface. Mouth anterior, situated at a distance of 3.5 mm. from the anterior body end, leading into the lobed pharyngeal chamber. Main gut extends backward to near the hind end of body.

Male and female genital openings approximated, placed close behind pharyngeal chamber. Internal genital organs quite similar to those of the preceding species.

The Misaki specimens we have observed seem to tally well with Collingwood's *Sphyngiceps lacteus* from Singapore, so far as the existing incomplete description of this goes. They are also not unlike *Eurylepta japonica* described by Stimpson from Hokkaido, but stand distinctly at variance from it chiefly in the presence of blackish spots on the dorsal surface.

19. *Pseudoceros luteomarginatus*, n. sp.

(Pl. I., fig. 5.—Textfig. 40).

This new species is based on four individuals obtained near Misaki at the low-water mark.

Body oval, with somewhat wavy margin, measuring 35 mm. in length and 15 mm. in breadth. The dorsal surface is slightly raised in the median parts.

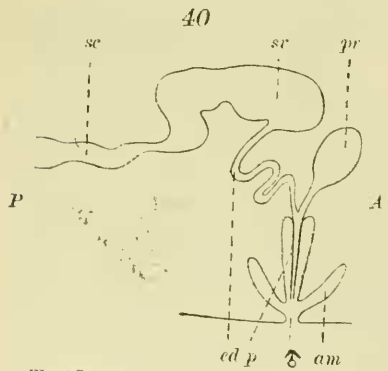
Dorsal surface velvety black, but bordered all round by a russet brown marginal and a clear yellow submarginal band. Ventral side dark and with marginal bands similar to, but less distinct than, those seen on the dorsal side.

Marginal tentacles appear as folded flaps of the frontal margin.

Numerous eye-spots distributed on both dorsal and ventral sides of tentacular flaps. Cerebral eye-spots lying close together in a round clear space over the brain.

Sucker situated at a point somewhat anterior to the centre of body. Mouth opening into the centre of the pharyngeal sheath placed in the first quarter of body. Main gut extends posteriorly nearly to the hind end of body.

Male genital apertures open in a pair, one on each side of the median line and close behind the pharyngeal chamber, there being present two sets of male genital end-organs. Seminal canal (textfig. 40, *sc*) of either side swells anteriorly into the seminal vesicle (*sv*) and gives rise inferiorly to the ejaculatory duct (*cd*). This pursues a tortuous course and receives at the base of penis the duct of the prostate (*pr*) which is placed anterior to the seminal vesicle. The penis is chitinous, styliform and vertically disposed. The antrum musculinum (*am*) shows an obliquely dorsally directed annular outbulging just before it opens externally at about the level of penis. The female genital aperture is single and medianly situated closely behind the male apertures. The female end-organs are essentially as in *Pseudoceros superbus* Lang.



Textfig. 40. Diagrammatic representation of the left male genital end-organs of *Pseudoceros luteomarginatus*, as seen from the right side.
Index letters as in textfig. 4.

The present species is apparently very nearly allied to *Eurylepta nigra* Stimpson from "Ousima" as well as to *Pseudoceros superbus* Lang and *P. flavomarginatus* Laidlaw, but may be distinguished from the first mentioned form by the presence of the yellow inner marginal band and by the absence of ocellated papilla, and from both the last two by the difference in colour of the marginal and submarginal bands.

20. ***Pseudoceros nigromarginatus***, n. sp.

(Pl. I., fig. 2.—Textfigs. 41, 42).

This species is founded on two individuals taken near the low-water mark at Matsuwa, near Misaki, and at Shirahama in Prov. Awa.

Body broadly elliptical, with frilled margin, measuring 40 mm. long by 22 mm. broad.

Dorsal surface of a blackish brown colour, margined completely around by a narrow but well-defined blackish band and showing two light-coloured longitudinal bands in the median zone, running one on each side of the median line. Ventral surface much paler than the dorsal, unpigmented.

Marginal tentacles appearing as two short folds of the frontal margin, when the animal is at rest (textfig. 41).

41

Textfig. 41. Marginal tentacles and eye-spots of *Pseudoceros nigromarginatus*.

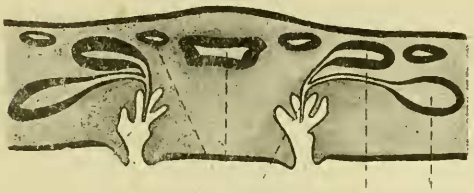
Numerous eye-spots distributed on the tentacular flaps. A cluster of eye-spots also occurring in a small round clear space above brain.

Sucker nearly central. Mouth situated a short distance behind brain. Male genital apertures present in a pair closely behind pharyngeal sheath, and separated from each other by an interspace of 3 mm. Female genital opening exists on the median line close behind the male apertures.

The seminal canal, proceeding foreward on either side, is continued into the seminal vesicle (textfig. 42, *sv*), which gives rise to an inwardly directed slender duct, the ejaculatory duct.

At the base of penis this receives the duct of the pyriform prostate (*pr*), lying just dorsal to the ejaculatory duct. The penis (*p*) is represented by a small horny stylet disposed vertically in the sheath. The antrum musculinum (*am*) forms an obliquely upwardly directed annular outbulging before it opens externally through the short tubular part.

42



Textfig. 42. Male genital end-organs of *Pseudoceros nigromarginatus* in a cross section. Semidiagrammatic. Index letters as in textfigs. 4 and 7.

Family **Euryleptidæ** Lang.

Genus ***Cycloporus*** Lang 1884.

21. ***Cycloporus papillosus*** (M. Sars).

(Pl. I., fig. 9).

Two individuals of this form were discovered beneath stones between the tide-marks at Misaki.

Body oval, moderately firm, 9 mm. long by 6 mm. broad. Dorsal surface of an ochraceous colour, dark in the median longitudinal zone, flecked with numerous russet and some darker spots in the place of dorsal papillæ which are altogether absent in the Misaki form. Along the body margin a series of dark spots indicating position of the end-vesicles of intestinal branches. Frontal margin produced into two short but distinct marginal tentacles with rounded end.

Tentacular eye-spots distributed at base of each marginal tentacle. Cerebral eye-spots arranged in two distinct groups over the brain region.

Mouth situated slightly behind the brain. Main gut extends backward to near the posterior end of body, giving rise to 6 pairs of lateral intestinal branches in its course. The branches distinctly anastomose; the terminal branches open to the exterior by minute pores on the lateral body margin. Sucker placed slightly in front of the centre of ventral surface. Male and female genital apertures lie between the mouth and the sucker.

Structurally the specimens present a close resemblance to *Cycloporus papillosus* (M. Sars), a species widely distributed in Europe.

The Misaki form seems to be closely allied to *C. papillosus* var. *levigatus*, but may be distinguished from this in the appearance of marginal tentacles. However, such a slight difference does not appear to us to be of more than varietal value.

Family **Prosthiostomidæ** Lang.

Genus ***Prosthiostomum*** Quatrefages 1845.

22. ***Prosthiostomum siphunculus*** (Delle Chiaje).

(Pl. II., fig. 13).

Planaria siphunculus, Delle Chiaje 1828, p. 118.—1841, p. 131.—Verany 1846, p. 9.
Prosthiostomum elongatum, Quatrefages 1845, p. 136.—Stimpson 1857, p. 4.—Schmidtlein 1880, p. 172.
Prosthiostomum aratum, Quatrefages 1845, pp. 135, 136.—Stimpson 1857, p. 4.
Leptoplana arcta, Diesing 1850, p. 196.—1862, p. 538.
Leptoplana elongata, Diesing 1850, p. 196.—1862, p. 538.
Prosthiostomum hamatum, O. Schmidt 1861, pp. 11, 12.
Leptoplana hamata, Diesing 1862, pp. 538, 539.
? *Prosthiostomum emarginatum*, Leuckart 1863, p. 169.
Mesodiscus inversiporus, Minot 1877, p. 451.
Prosthiostomum siphunculus, Lang 1884, pp. 595–601.

A large number of specimens referable to this species, originally described from the Bay of Naples, were collected between the tide-marks at Misaki, Matsuwa and Shirahama.

Body elongate, for the most part nearly uniformly broad, rounded anteriorly and somewhat pointed posteriorly. An average-sized specimen in the creeping state measured 21 mm. long by 3 mm. broad.

General colour of body buffy, growing deeper in tone towards the median parts, nearly cinnamon over the main gut; pharynx showing itself in a grayish colour but with a cinnamon median stripe over the parts. Minute whitish spots scattered in the median parts in a fairly numerous number.

Cerebral eye-spots arranged in two, nearly linear groups; marginal eye-spots arranged in a crescentic group along the frontal margin, there existing commonly two spots in the width of it.

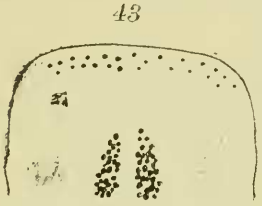
23. ***Prosthiostomum grande*** Stimpson.

(Pl. II., fig. 2.—Textfigs. 43, 44).

Prosthiostomum grande, Stimpson 1857, pp. 4, 10.
Leptoplana grande, Diesing 1862, p. 539.
? *Prosthiostomum affine*, Stimpson, pp. 4, 10.
Leptoplana affinis, Diesing 1862, p. 539.
Prosthiostomum grande, Lang 1884, p. 603.

With Stimpson's *Prosthiostomum grande* from "Ousima" we identify the numerous specimens which were collected at Misaki, Matsuwa and Mera. They were found adhering to the underside of stones and shells near the low-tide mark.

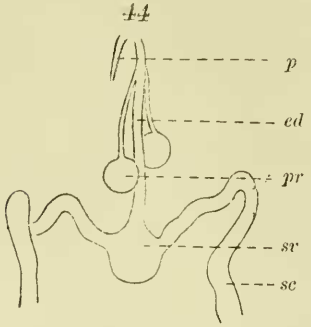
The body is of an oblong shape, rounded at both ends, though somewhat more broadly anteriorly than posteriorly. It may measure 22 mm. in length and 5 mm. in breadth. The texture is very delicate.



Textfig. 43. Eye-spots of *Prosthiostomum grande*.

The translucent body presents a light buffy ground colour. There exists a dark-looking median zone, inclosing a light buffy space in front of the middle. Fairly uniformly distributed all over the dorsal surface are numerous small spots of an ochraceous colour.

Cerebral eye-spots in two crowded groups; marginal eye-spots about 25 in number, forming two irregular rows along the frontal margin (textfig. 43).



Textfig. 44. Diagrammatic representation of the male genital end-organs of *P. grande*, as seen from the ventral side.
Index letters as in textfig. 4.

Sucker nearly in the centre of the ventral surface. Mouth situated near the brain and at the anterior end of the pharyngeal sheath, which extends through a great part of the median zone in the anterior half of body.

Genital apertures closely behind pharyngeal sheath. End-organs of genital systems essentially similar to those of the preceding species and quite as were described by Lang in

detail. The seminal canals (textfig. 44, *sc*), coming from behind, make an abrupt inward turn slightly behind the penis (*p*) to enter the seminal vesicle (*sv*), which gives rise anteriorly to the ejaculatory duct (*ed*). This receives at the base of penis the ducts of two small and spherical prostates (*pr*), one on each side of the ejaculatory duct. Penis small, styliform.

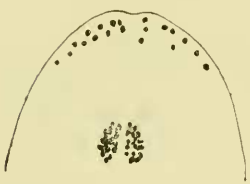
24. ***Prosthiostomum marmoratum***, n. sp.

(Pl. I., fig. 8.—Textfigs. 45, 46).

A large number of this species were collected between the tide-marks at Shirahama in Prov. Awa.

Body elongate, anteriorly rounded, nearly uniformly broad for a great part of its length, posteriorly tapering to a point; dorsal surface slightly raised in the median parts behind cerebral eyes. In the fully extended state the worm may reach 21 mm. in length and 5 mm. in breadth.

45

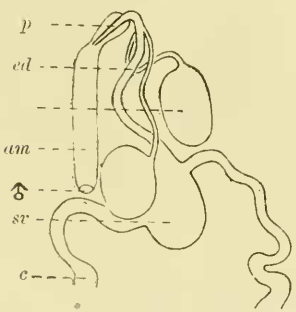


Textfig. 45. Eye-spots of *Prosthiostomum marmoratum*.

Dorsal surface yellowish buff and marked all over, except at the head end, with irregular brownish blotches, which at times join together in the median parts into two longitudinal dark-brownish bands.

Cerebral eye-spots densely grouped in two oval clusters, in a common colourless space of an oval shape. Marginal eye-spots confined to the frontal margin, numbering eighteen or thereabout (textfig. 45).

46



Textfig. 46. Diagrammatic representation of the male genital end-organs of *P. marmoratum*, as seen from the ventral side. Index letters as in textfig. 4.

Sucker nearly central. Mouth placed close behind brain. Pharyngeal chamber cylindrical, extending from behind brain to about the middle of body. Pharynx cylindrical, but with triangular lumen.

Genital end-organs essentially as in the preceding species,

but characteristic to the present species is the presence of two moderately large and ovoid prostates (textfig. 46. *pr*), situated closely in front of the seminal vesicle (*sv*) on either side and opening into it at base of penis. Penis (*p*) small, styliform, and hanging in the tubular antrum musculinum (*am*), which opens externally closely behind the pharyngeal chamber.

25. ***Prosthiostomum awaense***, n. sp.

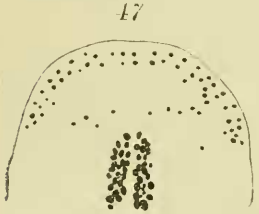
(Pl. II., fig. 12.—Text g. 47).

This species is based on a single specimen obtained on the coast of Shirahama in Prov. Awa.

Body closely similar in shape to the preceding species, being slender, anteriorly rounded and posteriorly tapering to a point. 22 mm. long, 5 mm. broad.

Dorsal surface of a rather deep buffy colour, with a brownish longitudinal band in the median line. Ventral surface much paler, exhibiting slender seminal canals and uteri in a whitish colour.

Cerebral eye-spots crowded in two oblong clusters, each comprising about 28 of them. Marginal eye-spots confined to the frontal margin in front of the cerebral groups, forming an irregular row two or three deep. Besides, a few eye-spots scattered closely in front of the cerebral groups (textfig. 47).



Textfig. 47. Eye-spots of *Prosthiostomum awaense*.

Sucker, mouth and genital apertures situated as in the preceding species. Main gut extends to near the posterior end of body, giving rise to numerous lateral intestinal branches on both sides. Internal genital organs as in other *Prosthiostomum* species in all essential points.

The species seems to be especially closely allied to *Prosthiostomum siphunculus* D. Ch., *P. pallidum* Laidlaw and *P. lineatum* Meixner, but may be distinguished from any of them by the different arrangement of eye-spots.

26. ***Prosthiostomum rubropunctatum***, n. sp.

(Pl. II., fig. 9.—Textfig. 48).

This new species is founded again on a single specimen, which was collected between the tide-marks at Misaki.

Body elongate, narrow, broadly rounded at the head end, pointed at the posterior end. Length 15 mm.; breadth 2,5 mm.

Dorsal surface buffy in ground colour, minutely dotted all over with reddish brown pigments; a dark median line extending posteriorly from cerebral eye-spots.

Cerebral eye-spots in two dense groups of an oblong outline at about the hind border of the first seventh of body; each group surrounded by an oval colourless space, the two spaces converging anteriorly and uniting in the anterior parts. Besides, there exist numerous marginal eye-spots arranged in two or three rows in the semicircular submarginal tract in front of the cerebral eyes (textfig. 48).

48

Textfig. 48. Eye-spots of *Prosthiostomum rubropunctatum.*

End-organs of genital systems essentially similar to those of *Prosthiostomum siphunculus*, etc. It also seems to be nearly related to *P. obscurum* Stimpson from Hong-Kong, though differing in the arrangement of eye-spots.

Key to Species of the Polyclads treated of in this paper.

A. Without ventral sucker . . . . . Suborder **Acotylea.**

a.[1] Marginal eyes present . . . . . Section Craspedommata.

a.[2] Without nuchal tentacles.

a.[3] With a single genital aperture.

Penis large. Numerous prostates open on walls of penis and antrum. Accessory vesicle of vagina horseshoe-shaped . . . . . Genus *Discocelis.*

Body broadly oval, light vinaceous cinnamon, darker in the central parts, with small darkish brown blotches uniformly distributed all over. Tentacular eye-spots in two round, crowded clusters. Cerebral eye-spots in somewhat linear clusters; each cluster divided by brain into an anterior and a posterior group . . . . . 1. *D. japonica.* p. 3.

b.[3] With 3 genital apertures.

Without true seminal vesicle. Prostate opening into ejaculatory duct by a distinct duct. Penis unarmed. There occurs a duplicate penial system either in front of or behind the functional. A part of vagina forming a prominent compact spiral coil. Vagina and vaginal duct running nearly in a circle and both opening into antrum femininum just within the external female aperture . . . . . Genus *Bergendalia.*

Body elongate-slender, of a grayish buff-pinkish colour, with a reddish median streak. Marginal eye-spots in a row or rows around body; besides, numerous eye-spots densely distributed all over the head end . . . . . 2. *B. diversa.* p. 8.

b.[2] With nuchal tentacles.

With true seminal vesicle. Prostate separated from ejaculatory duct. Penis unarmed. Without accessory vesicle to vagina . . Genus *Stylochus.*

c.[3] Body elliptical, of a reddish orange or a brick colour, dotted more or less uniformly with minute reddish spots. Tentacular eye-spots confined to basal parts of each tentacle; cerebral eye-spots scattered close together over brain region . . . . . 3. *St. rutilus.* p. 5.

d.[3] Body broadly elliptical, deep-buffy in colour, dotted more or less uniformly with minute purplish gray pigment spots. Tentacular eye-spots arranged close together on tentacles; cerebral eye-spots in two bands which diverge anteriorly . . . . . 4. *St. ijimai.* p. 6.

b.[1] Marginal eyes absent . . . . . Section Schematommata.

c.[2] Prostate along the course of ejaculatory duct.

e.[3] With true seminal vesicle and accessory vesicle to vagina.

With or without tentacles and penial stylet . . . . . Genus *Notoplana.*

a.[4] Nuchal tentacles small, bluntly pointed. Without penial stylet.

Body elongate, anteriorly rounded, posteriorly bluntly pointed, translucent, of an olive-buffy colour. Tentacular eye-spots in a crowded cluster at base of each tentacle; cerebral eye-spots scattered over brain region on either side of the median line . . . . . 5. *N. humilis.* p. 11.

b.[4] Nuchal tentacles absent. With penial stylet.

Body as in the preceding, translucent, buffy, with a brownish orange stripe in the median line. Tentacular and cerebral eye-spots blend together, distributed on either side of brain . . . . . 6. *N. delicata.* p. 13.

f.[3] Without true seminal vesicle and accessory vesicle to vagina.

Nuchal tentacles present. With large accessory seminal vesicle. Penis with stylet . . . . . Genus *Hoploplana.*

Body broadly oval. Ground colour milky white or somewhat buffy, traversed by broad radial bands of a russet or brownish russet colour, which bands reticulate in the median or central parts, bringing about a limited number of unpigmented and unequal sized mesh-like spaces. Tentacles slenderly conical. Tentacular eye-spots forming a complete circle; cerebral eye-spots in two groups closely inside the tentacular . . . 7. *H. ornata.* p. 15

d.[2] Prostate separated from ejaculatory duct and opening into it by a distinct duct.

g.[3] Without penis.

c.[4] Nuchal tentacles absent. Prostate ventral in position. With true seminal vesicle. Cirrus cavity beset with chitinous bristles. Accessory vesicle of vagina small and rudimentary . . . . . Genus *Neoplanocera.*

Body elongate-oval, pale-yellowish coloured. Tentacular and cerebral eye-spots blend together, arranged on either side of median line. . . . . 8. *N. elongata.* p. 17.

d.[4] Nuchal tentacles present. Prostate dorsal in position.

a.[5] Without bursa copulatrix.

With true seminal vesicle. Cirrus cavity beset with chitinous bristles. With vagina bulbosa. Accessory vesicle of vagina small and rudimentary . . . . . Genus *Planocera.*

a.[6] Body broadly oval, large. Colour variable, more or less dark on account of blackish punctate pigments present all over in reticular distribution, leaving numerous small mesh-spaces free of them. Tentacles sometimes more than one in a group on each side. Tentacular eyespots in close circular group; cerebral eye-spots arranged over brain on either side of the median line . . . . . 9. *P. reticulata.* p. 19.

b.[6] Body oval, comparatively small, of a dark purplish colour. Tentacular group of eye-spots in close circle; cerebral eye-spots in two paired groups . . . . . 10. *P. purpurea.* p. 22.

b.[5] With bursa copulatrix.

With accessory seminal vesicle. Vagina bulbosa unarmed. Accessory vesicle of vagina large . . . . . Genus *Paraplanocera*.

Body broadly elliptical, with frilled margin. Colour olive-buffy, dotted irregularly with a large number of minute milky white spots, intermingled with some others of a dark brownish colour. Besides, there exist all along the body margin numerous minute yellow and white dots in a single or more rows. Tentacular eye-spots in two complete circular groups; cerebral eye-spots in two distinct elongate clusters . . . . . 11. *P. misakiensis*. p. 23.

h.[3] With penis.

e.[4] Accessory vesicle of vagina single.

Tentacles indistinct. With true seminal vesicle. Prostate dorsal in position. Penis unarmed . . . . . Genus *Pseudostylochus*.

c.[5] Ground colour buffy.

e.[6] Body oval, uniformly dotted all over with minute brown spots. Tentacular eye-spots in two irregular compact groups; cerebral eye-spots irregularly scattered over brain region in two lateral groups . . . . . 12. *P. takeshitai*. p. 26.

d.[6] Body broadly oval, densely dotted with minute brownish orange pigments. Tentacular eye-spots in two irregular compact clusters; cerebral eye-spots in two elongate tracts . . . . . 13. *P. fulvus*. p. 28.

d.[5] Ground colour deep olive-buffy.

Body oval or elliptical, dotted all over with minute dark greenish pigments. Arrangement of eye-spots as in the preceding species . . . . . 14. *P. obscurus*. p. 30.

f.[4] Accessory vesicle of vagina paired.

Tentacles distinct. With true seminal vesicle. Prostate dorsal in position, opening at apex of penis together with ejaculatory duct. Penis unarmed . . . . . Genus *Callioplana*.

Body oval, with frilled margin, of a velvety black colour, bordered all round with a narrow band of tawny brown just inside the colourless margin. Tentacular eye-spots forming a group in the basal parts of each tentacle; cerebral eye-spots in two elongate tracts . . . . . 15. *C. marginata*. p. 32.

B. With ventral sucker . . . . . Suborder **Cotylea**.

a.[1] With Marginal tentacles. Intestinal branches forming an anastomosing system.

a.[2] Tentacles appear as marginal folds; pharynx folded; numerous gut branches.

a.[3] With papillæ all over dorsal surface. Tentacles sharply pointed. Male copulatory organs paired . . . . . Genus *Thysanozoon*.

Body broadly oval, purplish gray or yellowish purple in colour, with a whitish or yellowish median stripe . . . . . 16. *Th. brocchii*. p. 34.

b.[3] Without dorsal papillæ.

Male copulatory organs single or paired . . . . . Genus *Pseudoceros*.

a.[4] Penis single.

a.[5] Body somewhat oval, with strongly crenulated margin. Dorsal surface showing all over a coarse reticulum of broad olive-gray bands, with a number of much lighter coloured mesh-like spaces of various sizes. Minute black pigment dots scattered nearly uniformly all over the surface . . . . . 17. *P. reticulatus*. p. 35.

b.[5] Body oval, with frilled margin. Dorsal surface rosy colour with a number of scattered blackish spots and a lightly coloured median stripe; with a blackish marginal and a russet brown submarginal band all around . . . . . 18. *P. lucteus?* p. 37.

b.[4] Penis paired.

c.[5] Body oval, with somewhat wavy margin. Colour velvety black, bordered all round by a russet brown marginal and a clear yellow submarginal band . . . . . 19. *P. luteomarginatus*. p. 37.

d.[5] Body broadly elliptical, with frilled margin, of a brownish black colour, margined completely around by a narrow but well-defined blackish band and showing two light-coloured longitudinal bands in the median zone . . . . . 20. *P. nigromarginatus*. p. 39.

b.[2] Marginal tentacles projecting, not fold-like; pharynx cylindrical; gut branches not numerous.

With or without minute dorsal papillæ. Terminal branches of intestine opening externally by minute pores on lateral body margin . . . . . Genus *Cycloporus*.

Body oval, of an ochraceous colour, flecked with numerous russet and some darker spots . . . . . 21. *C. papillosus*. p. 40.

b.[1] Without marginal tentacles. Intestinal branches giving no evidence of forming an anastomosing system.

Pharynx cylindrical, anteriorly directed. Penis with stylet. Prostate paired . . . . . Genus *Prosthiostomum*.

c. Cerebral eye-spots in two linear groups.

Body elongate, of a buffy colour, nearly cinnamon in the median line . . . . . 22. *P. siphunculus*. p. 41.

d.[2] Cerebral eye-spots in two compact clusters.

c.[3] Marginal eye-spots few in number.

c.[4] Body of an oblong shape, rounded at both ends, light buffy in ground colour, uniformly dotted all over with numerous small spots of an ochraceous colour . . . . . 23. *P. grande*. p. 42.

d.[4] Body elongate, yellowish buffy except at the head end, marked all over with irregular brownish blotches . . . . . 24. *P. marmoratum*. p. 43.

d.[3] Marginal eye-spots numerous.

e.[4] Body elongate, of a rather deep buffy colour, with a brownish longitudinal band in the median line . . . . . 25. *P. awaense.* p. 44.

f.[4] Body elongate, buffy, minutely dotted all over with reddish brown pigments; a dark median line extending behind from cerebral eye-spots . . . . . 26. *P. rubropunctatum.* p. 45.

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PLATE I.

Plate I.

Fig. 1. *Callioplana marginata* Stimpson.

Fig. 2. *Pseudoceros nigromarginatus*, n. sp.

Fig. 3. *Pseudoceros reticulatus*, n. sp.

Fig. 4. *Planocera reticulata* (Stimpson).

Fig. 5. *Pseudoceros luteomarginatus*, n. sp.

Fig. 6. *Pseudoceros lacteus* (Collingwood)?

Fig. 7. *Planocera purpurea*, n. sp.

Fig. 8. *Prosthiostomum marmoratum*, n. sp.

Fig. 9. *Cycloporus papillosus* (M. Sars).

Fig. 10. *Pseudostylochus obscurus*, n. gen., n. sp.

Fig. 11. *Thysanozoon brocchii* (Grube).

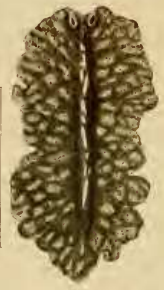

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PLATE II.

Plate II.

Fig. 1. *Stylochus rutilus*, n. sp.
Fig. 2. *Prosthiostomum grande* Stimpson.
Fig. 3. *Discocelis japonica*, n. sp.
Fig. 4. *Neoplanocera elongata*, n. gen., n. sp.
Fig. 5. *Paraplanocera misakiensis*, n. sp.
Fig. 6. *Notoplana humilis* (Stimpson).
Fig. 7. *Hoploplana ornata*, n. sp.
Fig. 8. *Stylochus ijimai*, n. sp.
Fig. 9. *Prosthiostomum rubropunctatum*, n. sp.
Fig. 10. *Pseudostylochus fulvus*, n. gen., n. sp.
Fig. 11. *Pseudostylochus takeshitai*, n. sp.
Fig. 12. *Prosthiostomum awaense*, n. sp.
Fig. 13. *Prosthiostomum siphunculus* (Delle Chiaje).
Fig. 14. *Notoplana delicata*, n. sp.
Fig. 15. *Bergendalia diversa*, n. sp.


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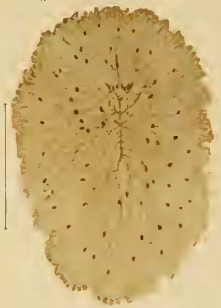
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